

ULTEM 1010

APPLICATIONS

ULTEM 1010 resin is the newest high-performance FDM thermoplastic, offering excellent strength and thermal stability and the ability to withstand steam autoclaving. With food-contact and bio-compatibility certifications, ULTEM 1010 resin is perfect for specialized applications including food-production tools and custom medical devices. ULTEM 1010 resin offers the highest heat resistance, chemical resistance and tensile strength of any FDM thermoplastic and is ideal for an out-of-cabin aerospace applications and under-the-hood automotive applications.

Mechanical Properties ¹	Test Method	English		Metric	
		XZ Axis	XZ Axis	XZ Axis	XZ Axis
Tensile Strength, Yield (Type 1, 0.125", 0.2"/min)	ASTM D638	9,300 psi	6,100 psi	64 MPa	42 MPa
Tensile Strength, Ultimate (Type 1, 0.125", 0.2"/min)	ASTM D638	11,700 psi	5,400 psi	81 MPa	37 MPa
Tensile Modulus (Type 1, 0.125", 0.2"/min)	ASTM D638	402,000 psi	322,000 psi	2,770 MPa	2,200 MPa
Tensile Elongation at Break (Type 1, 0.125", 0.2"/min)	ASTM D638	3.3%	2.0%	3.3%	2.0%
Tensile Elongation at Yield (Type 1, 0.125", 0.2"/min)	ASTM D638	2.2%	1.5%	2.2%	1.5%
Flexural Strength (Method 1, 0.05"/min)	ASTM D790	21,000 psi	11,100 psi	144 MPa	77 MPa
Flexural Modulus (Method 1, 0.05"/min)	ASTM D790	409,000 psi	324,000 psi	2,820 MPa	2,230 MPa
Flexural Strain at Break (Method 1, 0.05"/min)	ASTM D790	No break	3.5%	No break	3.5%
IZOD Impact, notched (Method A, 23°C)	ASTM D256	0.8 ft-lb/in	0.4 ft-lb/in	41 J/m	24 J/m
IZOD Impact, un-notched (Method A, 23°C)	ASTM D256	6.1 ft-lb/in	2.6 ft-lb/in	326 J/m	138 J/m
Compressive Strength, Yield (Method 1, 0.05"/min)	ASTM D695	19,500 psi	15,100 psi	134 MPa	107 MPa
Compressive Strength, Ultimate (Method 1, 0.05"/min)	ASTM D695	No break	15,500 psi	No break	1,125 MPa
Compressive Modulus (Method 1, 0.05"/min)	ASTM D695	1,450,000 psi	305,000 psi	10,000 MPa	1,120 MPa

Thermal Properties ²	Test Method	English	Metric
Heat Deflection (HDT) @ 66 psi, 0.125" unannealed	ASTM D648	421°F	216°C
Heat Deflection (HDT) @ 264 psi, 0.125" unannealed	ASTM D648	415°F	213°C
Vicat Softening Temperature (Rate B/50)	ASTM D1525	416°F	214°C
Glass Transition Temperature (Tg)	DSC (SSYS)	419°F	215°C
Coefficient of Thermal Expansion	ASTM E831	26x10 ⁻⁶ in/(in·°F)	47 μm/(m·°C)
Coefficient of Thermal Expansion (xflow)	ASTM E831	25x10 ⁻⁶ in/(in·°F)	41 μm/(m·°C)
Melting Point	-----	Not Applicable ³	Not Applicable ³

Electrical Properties ⁴	Test Method	Value Range
Volume Resistivity	ASTM D257	1.0 x10 ¹⁴ - 8.96x10 ¹⁵ ohm-cm
Dielectric Constant	ASTM D150-98	2.67
Dissipation Factor	ASTM D150-98	.001
Dielectric Strength	ASTM D149-09, Method A	240 V/mil

Other ²	Test Method	Value
Specific Gravity	ASTM D792	1.27
Rockwell Hardness	ASTM D785	109
Flame Classification	UL94	V0 (1.5 mm), V0, 5VA (3 mm)
Oxygen Index	ASTM D2863	0.44
Vertical Burn	FAR 25.853 (Test a (60s), passes at)	4 seconds
OSU Total Heat Release (2 min test, .060" thick)	FAR 25.853	35.7 kW min/m ²
UL File Number	-----	E345258
Food Safety Certification	NSF 51	Certified
Bio-compatibility Certification	ISO 10993/USP Class VI	Certified
Burn Testing		
Horizontal Burn (15 sec)	14 CFR/FAR 25.853	Passed (.060" thick)
Vertical Burn (60 sec)	14 CFR/FAR 25.853	Passed (.060" thick)
Vertical Burn (12 sec)	14 CFR/FAR 25.853	Passed (.060" thick)
45° Ignition	14 CFR/FAR 25.853	Passed (.060" thick)
Heat Release	14 CFR/FAR 25.853	Passed (.060" thick)
NBS Smoke Density (flaming)	ASTM F814/E662	Passed (.060" thick)
NBS Smoke Density (non-flaming)	ASTM F814/E662	Passed (.060" thick)

1- Build orientation is on side long edge.
2- Literature value unless otherwise noted.

3 - Due to amorphous nature, material does not display a melting point.
4 - All Electrical Property values were generated from the average of test plaques built with default part density (solid).